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ABSTRACT

This monograph describes the role of medical and graphic arts units within the comprehensive communications departments of health science educational institutions. Historical trends and contemporary practices are described. Suggestions are made for: organizational structure; services and activities; staff requirements; budget; facility requirements; equipment requirements; and operational procedures. The written text is supplemented with organizational charts and appropriate illustrations, and the appendixes include a list of sources of medical illustrators and a bibliography of texts related to medical art. (EMH)

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medical and graphic arts unit

A Guide to Organizing a medical and graphic arts unit in HEALTH SCIENCE EDUCATIONAL INSTITUTIONS

by Herbert R. Smith, Jr., M.A.
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This monograph was developed as a service to the health sciences academic community, under agreement between the author and the Office of Audiovisual Educational Development, Bureau of Health Manpower Education, Atlanta, Georgia, and the National Medical Audiovisual Center, National Library of Medicine, Atlanta, Georgia.

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About the Author

Herbert Smith received his B.A. degree from Albion College in 1958. After a year of art training at the Glasgow School of Art in Scotland, he entered the Department of Art as Applied to Medicine at Johns Hopkins, receiving his M.A. degree in 1961. He worked in the Medical Art Section at the National Institutes of Health for two and one-half years and then moved on to Baylor College of Medicine in Houston. He was appointed Director of Medical Illustration and Audio-visual Education at Baylor in 1969 and is currently involved in all aspects of medical communications.

Mr. Smith has served on the governing boards of the Association of Medical Illustrators and the Biological Photographic Association, Inc. He is an active member of the Health Sciences Communications Association and the American Medical Writers Association. He was General Coordinating Chairman of Biocommunications 70, the combined meeting of the AMI-BPA.

Preface

Today's needs for better health-care delivery demand improved communications techniques for support of education, research, and service in the health sciences. This need has resulted in a greatly increased use of visual media because of their proven effectiveness and efficiency for transmitting information. As a result, many health science institutions are finding it necessary to develop communication departments or to expand existing services.

This publication is designed to aid in establishing an effective medical and graphic arts unit as a component of a comprehensive communications department. An art unit no longer can serve the programs of an institution by producing occasional charts, graphs, and medical illustrations for publication. The availability of new media and improved educational technology has created a need for a wide range of production capabilities.

In the chapters which follow, two major recommendations evolve as the keys to establishing successful art units. First, a health sciences institution should acquire only well-qualified personnel for the communications department, and then rely on their judgement in developing the service. Secondly, the unit staff should tailor its capabilities to provide maximum support for all programs of the institution.

The information contained in these pages has been developed from the combined experience of many people to whom I am indebted. Special gratitude is owed to Michael E. DeBakey, M.D., president of Baylor College of Medicine, for his strong support of communications at Baylor and his personal example of dedication to professional excellence. Over the past eight years, members of the Baylor College of Medicine medical and graphic arts unit have devoted efforts beyond the call of duty to the development and refinement of many of the capabilities described. Valuable editorial advice was given by associate departmental director, R.D. MacIntyre; art unit head, Barry Baker; photography unit head, Robert Beaubien; and art unit members, Jan Redden, Tom Sims, Richard Hall, and Bill Stanger. Manuscript preparation would have been impossible without the patient support of Sally Mahan, Ginger Allen, and Gee Lindblom.

Thirty-nine directors of biomedical communications departments responded to a questionnaire and furnished valuable background information. A preliminary outline was reviewed and constructively criticized by a number of directors of communication departments, heads of art units, and members of the Professional Guidelines Committee of the Association of Medical Illustrators. Ruth Wakerlein of the University of Missouri and Martin Finch of the University of Minnesota deserve special mention for their contributions. Charles N. Farmer, Jr., and members of his Audiovisual Systems and Application Branch of the National Medical Audiovisual Center must be recognized for conceiving and completing this project.

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HISTORICAL BACKGROUND

The value of art as a communications medium has been recognized since earliest medical history. Ancient Egyptian art portrayed disease processes and medicine as it was then practiced. During the Renaissance, Leonardo da Vinci's anatomic drawings were an important contribution to early knowledge of anatomy. Andreas Vesalius' medical volume **De Humani Corporis Fabrica** is perhaps most famous for its illustrations.

Early in this century, the need for a program to produce illustrators trained in both art and the health sciences was evident. In 1910, Max Brodel (1870-1941) established the first teaching program in medical illustration by the formation of the Department of Art as Applied to Medicine at Johns Hopkins University School of Medicine. Students entered this new department already well-grounded in art and the basic biological sciences. They spent months in the anatomy laboratory, the autopsy room, and at the operating table to acquire the additional scientific background needed for medical illustration. They developed suitable drawing techniques and acquired the scientific approach and attitude. A second outstanding school of medical illustration was established in 1921 at the University of Illinois School of Medicine by Tom Jones (1885-1961). These training programs, with Brodel's and Jones' abilities and philosophies, provided the basis for today's field of medical illustration. Further research and development by first and second generation students of these men have evolved a profession responsive to the needs of education in the health sciences.

Graphic illustrators and designers have assumed an important role in health sciences communications, often without benefit of formal educational programs equivalent to those available for the medical illustrator. Artists with varying amounts of art education and ability adapted their techniques to health sciences subject matter largely through on-the-job experience. Historically, these illustrators and designers have provided a large portion of the total output of medical and graphic arts units in schools of the health sciences.

CONTEMPORARY PRACTICE

Today most health science institutions have medical and graphic arts units to support education at all levels. Undergraduate programs usually require illustrations for publication and visuals for classroom and self-instructional materials. *(see Figure 1)* Specialty training and continuing education add the need for exhibit and brochure

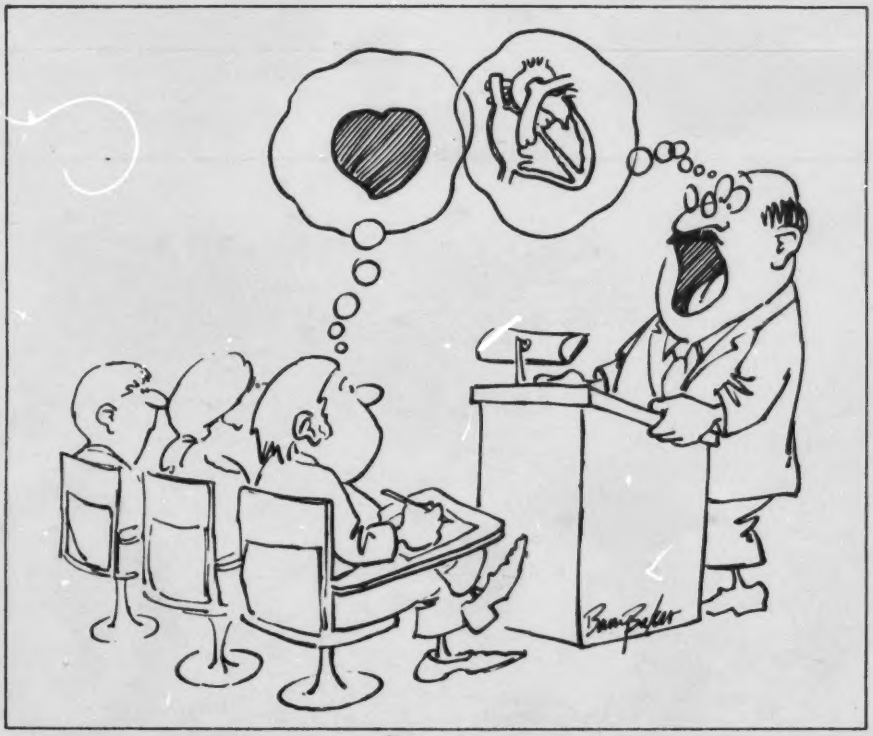


Figure *1.*

production.

The capabilities required for the support of education generally enable the art unit to support research and patient care as well. Research concepts may be visualized, progress documented, and final results illustrated. Visual support can aid in-service training, patient education, and the reporting of clinical experience. Internal institutional communications, public information, and public relations usually require additional illustrating skills.

PHILOSOPHY OF SERVICE: A TEAM APPROACH

Effective illustration for visual media requires a team approach. The instructor or author provides the scientific content and insight into the objectives of the presentation. The instructional designer aids in selecting the medium most appropriate for the scientific content and educational objectives of the product, and in designing the instructional package. The media specialist (e.g., illustrator, photographer, etc.) is responsible for the various aspects of production which provide for effective communication. In practice, the media specialist often assumes the role of the instructional designer and works directly with the client to develop teaching materials.

It is important for the various media specialists within the communications department to work as a cohesive team in order to provide productions of the highest possible quality. The illustrator must rely on the skills of a photographer, cinematographer, printer, or television director to transform his efforts into an effective end product. He must understand the technical considerations involved in arriving at the final product and gear

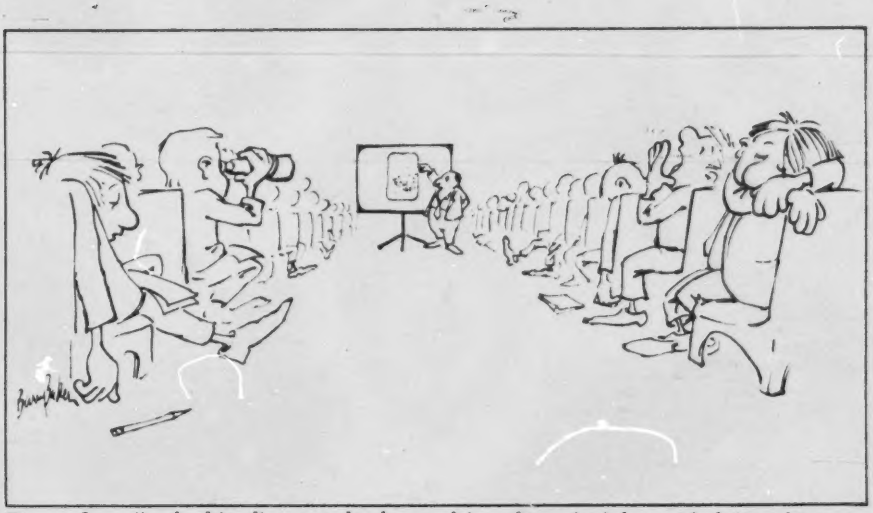


Figure 2. *"and this diagram* clearly *explains the principles underlying this very important concept. Next slide please..."*

his illustrations accordingly. Only through close cooperation among the media specialists can effective materials be produced.

Members of the medical and graphic arts unit should play an important role in the production of visual teaching media beyond simply transforming a client's rough idea into a finished drawing. *(see Figure 2)* If properly qualified, an artist can provide valuable input into the conception of instructional materials. He can help an instructor in the selection of **medium** and aid in the design of the total teaching package.

It is imperative for the members of the unit to recognize the importance of their part in the programs of their institution and to develop capabilities which serve the needs of these programs. The administration of the institution can best support the unit by providing positions for staff at salary levels which attract and keep top talent. An adequate number of qualified staff is necessary to meet the deadline situations which arise in a health science institution. Understaffing and low salaries are false economies if the art unit is not capable of producing effective visuals to support important programs.

ORGANIZATIONAL STRUCTURE

A central communications department, independent of individual academic departments, is important if an institution is to receive full benefit from its communications program. The service must be equally responsive to all needs of the institution and therefore should occupy an administrative position answering only to an appropriate high-ranking officer of the institution.

The ability of a central communications department to directly administer, supervise, and provide broad-based financial support for illustration personnel generally offers many advantages over the all too common practice of employing independent artists within separate academic departments. Space and equipment are more fully utilized and expenses are shared more equitably by all users of a central service. In the rare instances where specialized work of sufficient volume justifies an artist within an academic department, close cooperation with the central communications department will forestall unnecessary duplication of equipment and services.

The creative nature and technical qualifications of the personnel must be taken into consideration when formulating the organizational structure of a communications department. Barriers preventing direct communication between the illustrator and his client or with fellow workers must be avoided. Few professions require the combination of independent work and close cooperation with others that is necessary in media production. An organizational structure loose enough to provide for individual creative effort and tight enough to provide cohesion of the total program is required. Individual aptitudes for administration and supervision must be governing factors. Flexibility to change the structure as a department grows or changes in scope must exist.

As a rule, persons involved in the production of visual media function best if they are responsible to supervisors who thoroughly understand their work. In most instances, an artist is far better qualified to supervise and coordinate the activities of other artists than someone without the knowledge of art techniques. Generally, communications personnel work best under supervision limited to requested advice and aid in coordinating projects which require the efforts of a number of people. Few nonproduction oriented supervisors are able to provide this type of leadership support. Artwork rarely is totally independent of the other media specialties. Every illustration prepared for publication or projection must be photographed. A number of art projects require photography as an intermediate step toward the final product. Other projects require a combination of art and

photography. It is imperative that the illustrator and still photographer understand the principles and problems involved in each other's role in a project, and that they have opportunity for communication during production. Close interdisciplinary cooperation also is the key to effective motion picture and television productions. The highest standards of quality and efficiency can be met only by full integration of all communications disciplines.

The medical and graphic arts unit must be in physical proximity to photography, television, and other services involved in the program in order to assure the maximum benefits of an integrated team approach.

THE COMMUNICATION DEPARTMENT

Providing a blueprint for the organizational structure of a medical and graphic arts unit is particularly difficult because of the great variations in size among communications departments. A small communication department with limited personnel should require only a single director to supervise all services. This person usually will be experienced in one of the disciplines and have administrative aptitude.

As a communications department increases in size and scope it is advisable to divide it into individually supervised units. *(see Figure 3)* This type of structure is necessary in order to provide adequate supervision and coordination of each specialty and to provide individual members of each unit with ready accessibility to their supervisor

The director of the department may either rely heavily on the unit supervisors for administrative support or handle most administrative duties through his office with the aid of support personnel. If administration is handled primarily through the director's office, individual production-oriented unit supervisors may concentrate on supervision and coordination of production in their field of expertise rather than becoming involved in the time-consuming routine administration of the department. While the director of such a department will need to concentrate largely on administrative activities, it is important that he be familiar enough with production techniques to be able to coordinate the overall activities of the department.

In the very large department, the work volume may develop in a manner which necessitates further subdivision of the units. *(see Figure 4)* For example, the medical and graphic arts unit may need further subdivision to provide adequate supervision of all functions. In all instances, it is important for the organizational structure of the department to evolve as a logical response to the needs of the institution.

THE TEACHING DEPARTMENT

A communications department with a strong medical and graphic arts unit may be tempted to initiate an academic program for training medical illustrators. Such a decision should be weighed carefully. Currently, six schools *(see Appendix I)* offer degree programs in medical illustration, and there is a good balance between the number of graduates and the number of available positions. A new program generating illustrators for whom no positions are available would be performing a disservice. In the future, however, there likely will be a need for many additional medical illustrators. Any school considering undertaking a teaching role may receive information and guidance from the Accreditation Committee of the Association of Medical Illustrators.

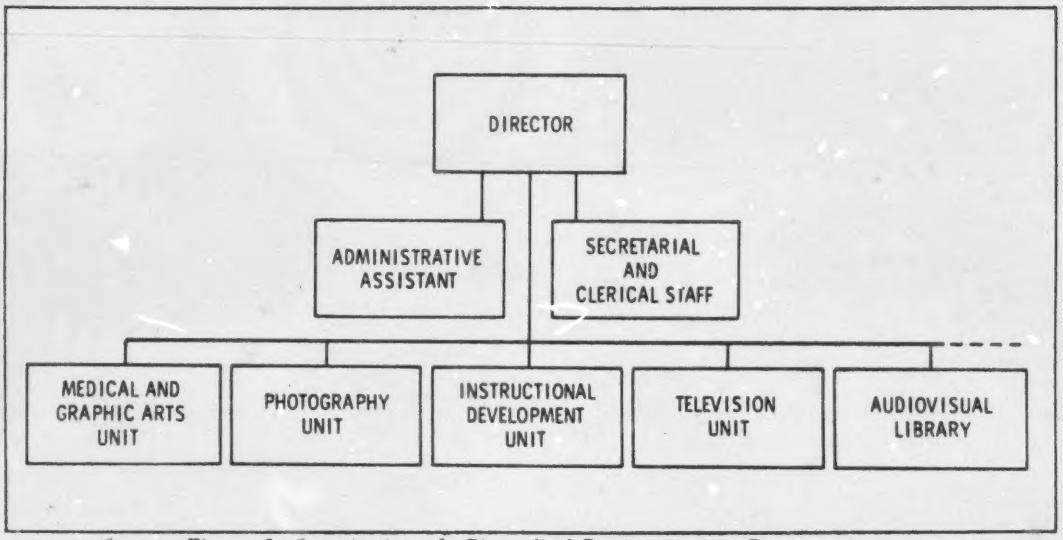


Figure *3. Organization of a Biomedical Communications Department.*

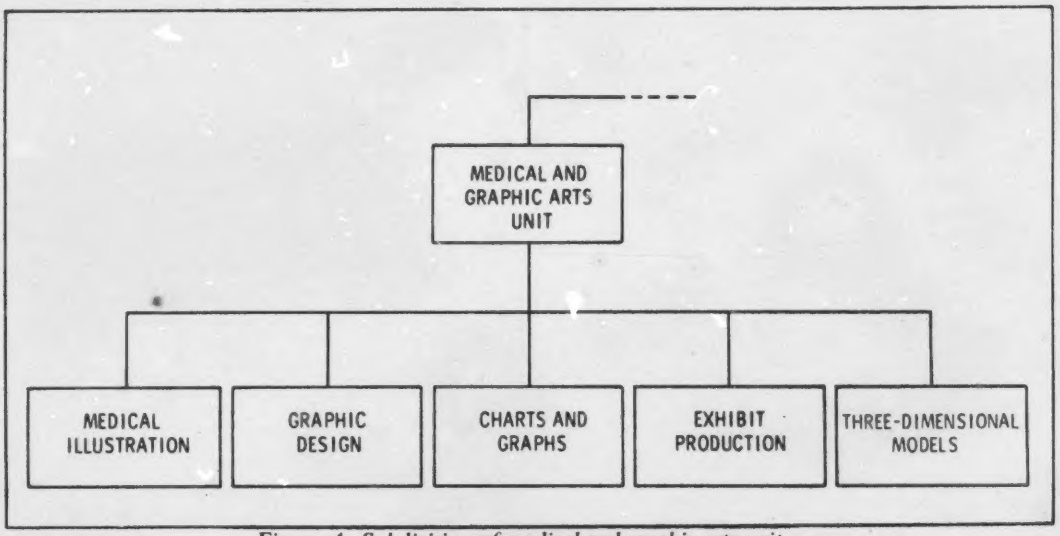


Figure *4. Subdivision of medical and graphic arts unit*

SERVICES AND ACTIVITIES

The services offered by the medical and graphic arts unit will vary according to the size of the institution and the scope of its programs. Any list of services is subject to modifications which might be necessary to serve the needs of specific teaching, research, or service programs. However, an art unit with the capabilities described below should be adequate to serve most programs.

It should be pointed out that even a single well-qualified illustrator theoretically could provide all of these capabilities. In practice, however, it is generally wiser for smaller units to limit their services to those which they can do well, within reasonable working hours. Larger projects such as exhibits and motion pictures can be particularly disruptive to the normal workload of a limited staff.

Consultation is one of the most important services offered by an art unit. A preplanning conference can aid in the proper selection of medium and can provide a client with guidelines to follow during his preliminary work on a project. Suggestions for improving the effectiveness of visuals conceived by a client often can improve the final product.

Textbook and journal illustrations generally involve the production of medical and graphic art using techniques designed for reproduction by offset lithography. *(see Figure 5)* It is important for the artist to understand the factors in the printing process which affect the final printed appearance of his work. Often art may be combined with photography to provide the most effective communication of the author's information.

Slide and filmstrip illustrations require techniques which produce a bold simplified image that can be easily seen and understood when projected. Color is usually desirable and mixed media can often be employed. Slides may require, in addition to pure medical or graphic illustration, techniques such as cartooning and very simple diagrammatic representation.

Motion picture illustrations and titles usually can be produced by applying the same principles and techniques used in successful slides.

Animation requires additional technical knowledge and an understanding of the principles which govern successful communication in media requiring motion.

Television graphics requires simplified illustrations because of the limited resolution of the television screen. The illustrator must understand the legibility limitations of this medium and design his material accordingly. The art unit may further support television production by providing set design and production.

Figure 5.

Exhibit design and production require an understanding of three-dimensional design and knowledge of materials and methods employed in exhibit construction. *(see Figure 6)* Illustration techniques must be modified for application to the exhibit panel. An in-house capability for photo-typesetting and silkscreen production will enable the unit to produce sophisticated exhibits at a reasonable cost, if the volume of exhibit work justifies the necessary space allotment and equipment expenditures. The communications department also may aid the exhibitor in the arrangements for exhibiting.

Three dimensional models, plastic embedding, and prostheses require skill in sculpture and a thorough understanding of available materials. Generally, three-dimensional work will require specialized equipment and space.

Brochures and other publications such as institutional newspapers, catalogs, and handbooks require graphic design and layout. Depending upon internal capabilities, the designer may be required to contact and coordinate commercial services. In instances where there is a steady demand, an in-house capability which includes typesetting and printing can save an institution a considerable amount of money for printed material.

Other services may represent a significant portion of the unit's total workload, but most can be provided by an art unit offering the basic services already mentioned. Phototypesetting and silkscreen process, used in exhibit production, provide an effective means to produce posters and signs. The facilities for brochures and other publications can be used to design and produce stationery, logos, certificates, forms, and other printed matter. Cartoons, caricatures, calligraphy, organizational charts, maps, architectural drawings, and photographic retouching and labeling may be provided.

Multiple use of illustrations can provide another facet to the unit's services. Techniques can be employed which provide effective use of a single piece of art in a number of presentation media. For example, a pen and ink drawing may be printed in a journal or textbook. Colors can be added with overlays to provide more visual impact for its use in a brochure. A photographic film positive can be produced and full color added, using a backpainting technique normally employed in animation, to provide an effective graphic for slide or filmstrip presentation. The same drawing can be applied to an exhibit panel in any desired color using the photographic silkscreen process. The artist's understanding of all available techniques and materials is of great importance both in the effectiveness of his work in its final form and in its economy by efficient multiple use.

New audiovisual media will undoubtedly have great impact upon the health sciences. It is important that the members of the medical and graphic arts unit continually update their knowledge in order to take fullest advantage of new developments.

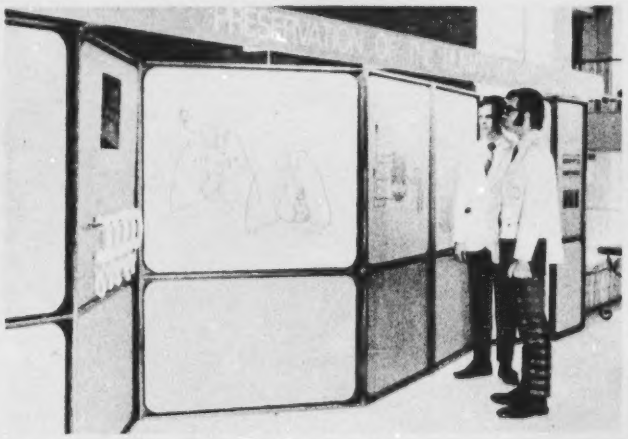


Figure 6.

STAFF REQUIREMENTS AND TRAINING

As visual communication assumes an increasingly important role in the health sciences, professionalism among members of the communications staff becomes more important. Qualified communicators can make significant contributions to the educational programs of a health sciences institution. An institution that appropriately recognizes the contribution which the communications department makes to its programs will benefit by improved staff morale and dedication. Recognition by means of academic appointment for communications personnel is increasing throughout the country. The prestige and fringe benefits accompanying these appointments often will provide the incentive needed to recruit and keep highly qualified people.

The individual members of any medical and graphic arts unit will have duties which evolve in response to demand for specific services. Therefore, job description and salary ranges will vary greatly. Often, the duties in the job descriptions which follow may overlap, particularly in the smaller department. It is important to select personnel for a medical and graphic arts unit on the basis of institution need. An illustrator well-qualified in one medium may not be able to respond to the needs of a program which requires little use of his specialty. In general, highly specialized artists are needed in the larger departments.

The salary ranges for each position described below are based on questionnaires returned from 39 medical school departments throughout the country in early 1972. Isolated deviations from the majority have been eliminated. It must be kept in mind that these figures are from throughout the United States and that they are not adjusted to differences in cost of living in various parts of the country. In general, the ranges should be considered as a minimum; upward adjustments should be made for individuals with unusual ability or outstanding experience. It cannot be too strongly emphasized that the quality of work produced by a medical and graphic arts unit is solely dependent on the visual communications skills of the members of that unit. Brilliant administration cannot provide for effective artwork without qualified artists.

Because the quality and volume of work are so dependent upon the individual illustrator, institutional support of his continuing education is a wise investment which can pay dividends in improved service. Subscriptions to periodicals; an adequate reference library; and attendance at professional association meetings, seminars, and workshops can aid the illustrator to keep up with changing techniques and new materials. Exposure to

work of one's peers at scientific meetings can provide the standards of comparison necessary to refine techniques and experiment with new methods.

Activity in local art leagues, art director's clubs, and other groups can also provide the artist with fresh insight into his work. Evening classes in a variety of courses can improve the skills of even the most experienced illustrator.

The unit supervisor should be an experienced artist who exhibits leadership qualities and an ability to work with people. In most instances, a trained medical illustrator is best suited to this position since he has an educational background which encompasses most of the techniques employed by an art unit, as well as a scientific background and knowledge about the educational methods employed in the health sciences

Generally, the supervisor is able to spend most of his time in production, particularly in the smaller unit. A second major part of his time involves consultation with clients and coordination of large projects. He channels work to the appropriate member of his unit, serves as a technical advisor to other artists, provides quality control, and makes decisions concerning need for addition or replacement of personnel. He is responsible for interviewing potential employees and directs their orientation and training. The supervisor should be familiar with the abilities of his personnel so that he can recommend salary increases, promotions, or appropriate training programs when necessary. Close supervision of routine workload should occupy relatively little of his time if the staff is adequately qualified.

Salary range for the unit supervisor generally is from $12,000 to over $35,000, depending on experience, administrative responsibilities, and the number of personnel in the unit.

The medical illustrator generally is trained in a recognized school of medical illustration and usually has earned a postgraduate degree. *(see Figure 7)* The term "medical" illustrator is somewhat of a misnomer since the background of these persons qualifies them as scientific illustrators for any of the health sciences. Some medical illustrators are self-trained and their aptitude can best be judged by a peer's critical examination of a portfolio of their work.

The duties of the medical illustrator generally include drawing of anatomical, surgical, and other scientific subject matter suitable for any final presentation medium; design and production of exhibits and brochures; construction of three-dimensional models and prostheses; and consultation with authors and instructors in the design and production of instructional materials. The trained medical illustrator has a background in photography which is sometimes needed in smaller departments. Some medical illustrators specialize in

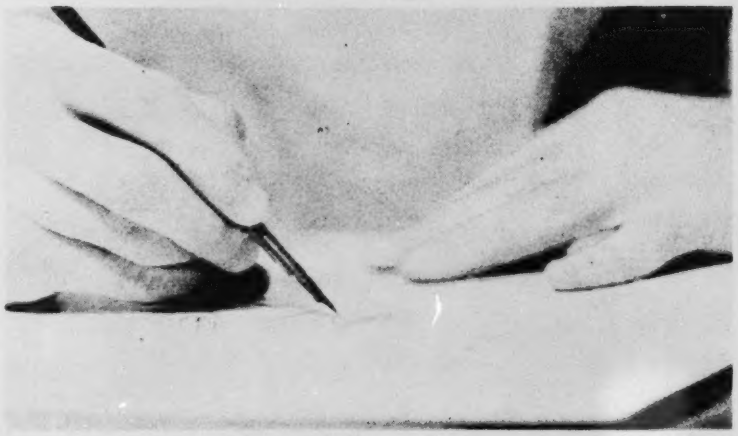


Figure 7.

a specific scientific discipline, such as ophthalmology or surgery.

Salaries for a graduate of a school of medical illustration begin at approximately $10,000 and range to above $20,000 without administrative duties.

The chartist or graphic artist produces charts and graphs for publication and other media. *(see Figure 8)* This person must have good visual sense and understand the principles involved in the design of a graph and its legibility in final form. The chartist must be proficient with various methods of lettering and with the materials available for producing charts and graphs, both in color and in black and white. Depending on their training and ability, many chartists produce diagrammatic drawings and participate in the production of a variety of projects.

Educational background for these important members of the medical and graphic arts unit varies widely, from the "artistic" high school dropout who is trained on the job, to the graduate art major. Unfortunately, at this time there are no formal educational programs specifically for the chartist. Consequently, varying degrees of on-the-job training are required in nearly every instance.

A person with an educational background which includes layout and design, lettering, color theory, and drafting is generally best qualified to serve as a chartist. A number of departments requires at least two years of college-level art. Persons with less educational background can be successfully trained in a unit that has experienced personnel to provide close supervision and instruction.

Starting salaries for trainees range between $5,000 and $8,500 depending upon educational background. The average starting salary for a beginning chartist with two years of college art is approximately $6,500 to $7,000. A college graduate currently starts at $7,800 to $8,500. A qualified chartist with 10 years' experience receives from $12,000 to $15,000.

The graphic designer does the design and layout of brochures, booklets, and other printed material. *(see Figure 9)* The designer is proficient in specifying typography, color separation, and other facets of producing camera-ready layouts for the printer. This person must thoroughly understand the technical considerations in the printing process in order to produce attractive work economically. In practice, the graphic designer often designs graphics for a number of media, including slides, films, exhibits, and television. The designer often is a proficient illustrator and therefore is able to provide added depth to the unit. In the small unit, this person may serve the functions of the chartist, general illustrator, and typesetter.

Education of the graphic designer generally involves a degree in commercial art,

Figure *8.*

Figure 9. *Preparation of camera-ready layout for publication*

although some have a degree in fine art with an emphasis on design courses. A few will have completed graduate programs in design.

Starting salaries range from $7,500 to $8,500, and an experienced designer with no administrative responsibilities can earn up to approximately $15,000.

The general illustrator is involved in drawings of a non-scientific nature as well as limited diagrammatic scientific illustration. Often their abilities make them a "jack of all trades" within the unit, providing backup for the chartist and the graphic designer. In the smaller department, the general illustrator may serve all of these functions.

Education usually encompasses a college degree in either fine art or commercial art. A few will have completed graduate art programs.

Starting salaries range from $7,500 to $8,500. The experienced general illustrator may earn up to approximately $15,000.

It is the opinion of this author that there is a current need for formal educational programs to produce medical graphic artists. A large portion of the output of any medical and graphic arts unit includes work that does not require the scientific knowledge and drawing ability of the medical illustrator. Persons trained to produce charts, graphs, schematic drawings, brochures, and other visuals for the health sciences community are needed. Principles of effective visual communication, scientific nomenclature, and appropriate art techniques could be taught in well-designed programs that would fill a need that has existed for some time.

BUDGET AND METHODS OF FINANCING

BUDGET

The cost of establishing and operating a medical and graphic arts unit varies according to its size and scope. *(see Figure 10)* Salaries of the personnel are, by far, the single largest expense factor. Cost for equipment and materials is smaller per unit of work than for most other production services within a communications department. Even if services include animation, silkscreen production, typesetting, and model construction, initial equipment expenditures can still be considered modest when compared to photography, television, or computer activities. If a reasonable volume of work exists in these areas, the equipment expenditures will be recovered quickly by the savings produced when work is done in-house rather than commercially.

Figure *10. "What d'ya mean fifty bucks for a drawing? A whole pad of that paper couldn't cost more than fifty cents!?"*

The critical point at which it becomes economically feasible to add specific internal capabilities can be determined only if accurate records are kept of the art unit's production. It is important to periodically analyze the volume of specific types of work which are farmed-out for commercial production. Often the addition of a capability will enable the institution to embark on a communications activity it could not afford previously.

The cost of supplies and materials will be modest for most art functions. In the author's department, which includes the full range of capabilities listed in Chapter III, the total cost of all supplies averaged only 20¢ per artist per hour over a recent one-year period. This cost might be reduced in a small unit offering fewer services.

METHODS OF FINANCING

The methods of financing a communications department vary widely among institutions. The alternatives range from complete self-support to total subsidy. No single approach stands out as ideal, although a partially subsidized department with some costs recovered by a fee for services appears to offer a number of advantages.

Self-supporting units must recover the costs of personnel, overhead, administration, equipment, and materials through a charging system. Information obtained from 39 medical schools indicated that no department is totally self-supporting in that none recovered all indirect costs such as technical space, utilities, and administrative offices. However, three private schools and one state school recovered all but a portion of indirect costs. It is probable that in a number of other instances, the medical and graphic arts unit approaches self-support, while the communications department as a whole requires subsidy for the director's office and/or units such as television, instructional technology, and computer-assisted instruction.

The main advantage of a self-supporting art unit is that no financial burden is placed on the institution but on the actual users who pay directly for the services obtained. The unit retains more independence in decisions concerning personnel and equipment expenditures. Services may be added or expanded whenever the demand reaches the point that income derived from a service can support its addition. Self-support may result in more motivation for the staff to operate an efficient unit as salary levels can more closely relate to individual productivity.

On the negative side, self-support necessitates prices which may inhibit maximum use of the service by the faculty and staff, especially members of lesser endowed academic departments. And unfortunately, funds are often scarce in departments whose primary needs for communication support relate directly to student education.

The self-supporting unit also may be at a disadvantage in improving or expanding services or introducing new techniques because the unit tends to be slightly understaffed in order to weather slow periods in its workload. New services are often delayed because of the inability to withstand a financial drain during the time it takes to establish full productivity. The important consultation function of the unit may be inhibited, and sometimes quality suffers because shortcuts must be taken to keep a project within the buget limitations of the client.

Total subsidy generally occurs in tax-supported institutions. Fourteen of thirty-nine medical schools were reported to be totally subsidized. All but two were State-supported institutions. Various methods of budgeting and financial control are employed. Often each academic department receives an allocated portion of the total communications budget and records are kept on use of the service. Requisitions for service generally require approval by the academic department chairman. Large projects must have the

approval of an administrative officer of the institution or of a committee established for that purpose. Often such projects must be budgeted far in advance.

The advantages of total subsidy are dependent upon adequacy of the allocated budget. If adequate, subsidy generally promotes a more active use of the service, often providing greatest advantage to teaching programs. The personnel in the unit may have more freedom for research in new techniques and materials. In some instances, subsidy may promote quality by allowing members of the unit to spend needed time on projects with less concern for cost limitations.

The primary disadvantage of total subsidy is that an inadequate budget can greatly inhibit the use of the service, preventing the institution from receiving the fullest potential support for its educational program. Without proper controls, abuses may occur with projects approved on the basis of political gain rather than value to the institution's goals and programs. In practice, a budgeted department tends to be locked-in to set salary increases and less able to reward professional growth of staff members. There may be a tendency for members of the unit to be less service-oriented and to play favorites among their clientel. The mechanics of budgeting and control can increase the administrative overhead of the communications department.

Partial subsidy exists in many forms. Budgeted funds may support varying combinations of indirect costs, overhead, and salaries. Many units need only charge a nominal fee to recover the cost of supplies. Some units receive a basic subsidy and must recover all expenses in excess of that amount. In some institutions, individual academic departments may receive funds designed for communications.

A partial subsidy can incorporate the advantages of both self-support and total subsidy and conceivably avoid some of the disadvantages of each. It is the author's opinion that the major disadvantage of a self-supporting department is that it may inhibit the full use of the service to support teaching programs. Research and patient care activities appear more able to afford to use the services of a self-supporting department. A partial subsidy designed to promote support of educational programs appears to offer a distinct advantage to the goals of most teaching institutions.

FUNDING OF DEVELOPMENTAL PROGRAMS

Financial support for development or expansion of communications programs presents different problems than the support of on-going programs. Often the capital investments in equipment and systems for a new activity are impossible to bear within the income of a self-supporting department or through a fixed annual subsidy. A high initial expense of television is an extreme example. Similar situations can occur in the medical and graphic arts unit, particularly in establishing a capability for typesetting, animation, or silkscreen. Grant money can be a valuable source of funding for developmental and expansion activities to provide capabilities which result in a long-term savings and to provide valuable services which cannot be obtained in any other way. However, eventual hard money support of salaries and on-going activities is important in order for the communications program to be stable enough to provide the long-term security necessary to attract and hold top personnel.

FACILITY REQUIREMENTS

ADEQUACY OF SPACE

In planning the facilities for the medical and graphic arts unit, consideration must be given to allowing sufficient space for anticipated long-range growth. A unit without space for expansion will find itself in the position of working under inefficient and distracting conditions which inhibit productivity and frustrate efforts to provide adequate service.

Space allotment should be determined by functional requirements. It is important for the personnel who will occupy the space and be responsible for its productivity to have a voice in the determination of total space allotment. Members of the unit must design the final configuration of the space based on their production techniques, equipment, personal work preferences, and future expansion plans.

PROXIMITY TO OTHER SERVICES

Proximity to other services in the communications department is a second important consideration in planning space for the art unit. *(see Figure 11)* If the unit is not convenient to administrative offices, photography, and art files, the user is inconvenienced and staff efficiency is reduced. Time spent taking a project from one unit to another and the hindrance to communication between various media specialists lessens both productivity and quality of work. Layout of the entire communications department must be determined by a logical workflow. Individual production units must not be considered as isolated functions.

ASSESSING SPACE REQUIREMENTS

Generalizations about space design cannot be expected to provide the ideal blueprint for any given institution. The recommendations which follow can only be considered as general guidelines and are developed to include three different types of space utilization: space for individual artists; space for a common work area; and space for specialized services.

Space for Individual Artists

Production of artwork requires independent work, and most artists prefer a degree of privacy. Generally, an individual can be more productive if provided with either a private

Figure 11. *"Now take this over to photography in the north end of the basement of the clinical science building, and tell them to shoot it on high contrast film. Also, tell them to watch out for...".*

office, or a cubicle formed by room dividers or partitions to provide the option of closing out distractions when necessary. Permanent walls should be avoided whenever possible. Ideally, individual space design should allow for maximum flexibility to provide for personal preference and rearrangement as functions expand or change. Windows should provide north light if at all possible.

The members of the unit have different requirements in both total space and its layout. The square foot requirements which follow are based on the assumption that an ample common work area is available. These figures should be considered as minimum; more space is desirable.

The unit supervisor requires space for a desk, drawing table, taboret, bookshelves, files, and seating for small conferences. Consultation with faculty and personnel requires the privacy of a separate office. If a conference room is readily accessible, 120 to 200 square feet generally will provide an adequate office for the unit supervisor.

The medical illustrator needs sufficient space for a desk, drawing table, taboret, bookshelves, and seating for clients. Conferences and the concentration required in this work necessitate privacy. One hundred to one hundred fifty square feet generally is adequate.

The chartist or graphic artist will need space for a drawing table, taboret, shelves, and seating for clients. Also space for an electric typewriter on a mobile stand may be needed. Sixty-four to one hundred square feet usually is adequate.

Graphic designers and general illustrators need space for a large drawing table, taboret, shelves, seating for clients, and sometimes a side table. Eighty to one hundred square feet usually is required.

Space for a Common Work Area

A number of functions requires space readily accessible to all members of the art unit. Even a one-person unit with the most limited space of services will need tables for laying out large projects, cutting, and mounting; a light-box table for tracing; a sink; storage cabinets for supplies; counter space for a dry-mount press; a paper cutter; and other miscellaneous equipment. A space which can be darkened should be allotted for a commercial art projector. Oversize paper face electric typewriters may be located in this common space if work volume does not justify providing machines for individual artists. A well ventilated area should be provided for spraying fixatives, paints, and other aerosol products.

As the number of artists increases, the square footage of the common work area must accommodate the need for concurrent layout of large projects, more tracing activity, and an increased supply inventory. Additional services will require space for specialized equipment, production, and supplies. Some of the equipment listed under other functional areas may be located in the common work area, especially in smaller departments. However, many of these functions involve noise, offensive fumes or darkness, and should be located in separate rooms.

A common work area for even a one- or two-illustrator unit requires a minimum of 120 to 200 square feet and as the unit size and workload increases, this space requirement could be much larger. Thus, a unit of four artists, for example, would require a combined personal and common work area of about 1,000 square feet.

Special Purpose Space

Exhibit Construction – The volume of work and techniques used are the two major factors affecting the space needed for exhibit production. *(see Figure 12)* A relative large volume may require space reserved solely for this function. A more professional exhibit can be produced using the silkscreen technique, but this requires more space than less sophisticated processes for applying art and copy to exhibit panels.

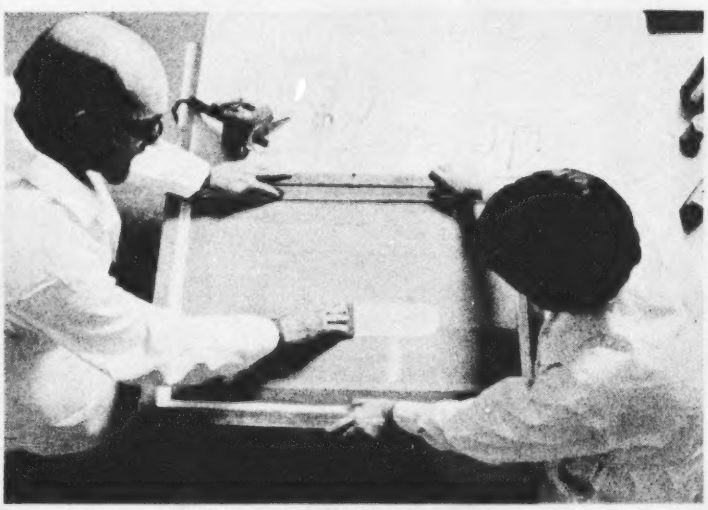


Figure *12. Silkscreen technique for exhibit production*

In the small facility, an occasional exhibit may be produced in areas generally used for other purposes. The common work area of the art unit or a photographic studio may be used if the need does not arise often enough to disrupt other on-going projects.

The production facility for a moderate volume of exhibits requires a relatively large room and an adjacent darkroom for making photographic silkscreens. The production room requires space for layout, screening surfaces, a workbench, screen storage racks, supplies, short-term panel storage, washer and adequate open area for final assembly. A minimum of 500 square feet is needed and more if the volume of exhibit production is large.

The darkroom contains the screen exposure equipment, and a large sink for the developing and wash-off of photographic screens. A minimum of 225 square feet should be adequate for the functions performed in this room. A second adjacent darkroom of about 60 square feet should be provided if the type of screen exposure source used cannot share the same room with developing. In this instance the size of the developing darkroom could be reduced by a similar amount. Photographic film positives can be made within the photography unit, and paste-up of typography and film positives can be accomplished within spaces already provided for individual artists.

The exhibit structure usually is constructed in the institution's shops or by an outside commercial firm. In some instances of a very large production volume, consideration might be given to providing a shop facility specializing in exhibits. Space would be needed for such functions as carpentry, painting, and electrical work. This shop could also serve to produce sets for television production and build specially designed equipment, cabinetry, and furniture for the communications department.

Exhibit Storage – The storage of finished scientific exhibits traditionally poses a problem for many institutions. In most cases, exhibit crates are kept within general storage space allotted to the individual department or in a warehouse. Whatever approach is taken, this problem should receive careful consideration. Safety of the exhibits and accessibility for future updating, repairs, or shipping are important factors in the location and size of this space.

Typesetting – The production of exhibits, films, and publications by the medical and graphic arts unit requires high quality cold-type. When the work volume justifies expenditures for a leasing arrangement for specialized equipment, efficiency and economy will be increased by providing typesetting on an in-house basis rather than having type set commercially. Leasing most or all of the equipment usually will prove most satisfactory.

Equipment needed for typesetting usually falls into two categories: a phototypesetter for larger type such as that used for exhibit copy, movie titles, and publication headlines; and a composer system for text used in publications. Ideally, the facilities for this activity should be planned after the equipment is selected. Equipment sizes and the need for a darkroom vary.

Phototypesetting often requires a darkroom with "wet" photographic capabilities. Smaller departments may find it practical to locate this function within the photographic unit of the communication department. If this function must be wholly self-contained, a darkroom with a sink and table surface for the equipment should contain 40 to 60 square feet. If phototypography equipment not requiring a darkroom is used, it may be located in the art unit's common work area. In larger units where the same individual produces all typography, the phototype equipment should be located near the composer system.

A limited volume of small character typesetting can be handled on a stand-alone composer about the size of an electric typewriter. A larger volume of work will require a

composer system with an input unit and an output unit, each approximately the size of a desk. A fairly heavy volume of work can be handled by one operator using these units. An extremely heavy production may require additional input units and operators. A soundproof room for this function should be located adjacent to the graphic designers, and be large enough to contain storage for supplies and jobs in progress. One hundred fifty square feet will provide adequate space for a single input system.

Three-Dimensional Models – The space required for the production of three-dimensional models, plastic embedding, and fabrication of prostheses varies greatly depending upon the emphasis which the institution places on this form of teaching aid. If only an occasional model for an exhibit is produced, space requirements will be minimal. Production of teaching models for extensive use as self-instructional devices requires a relatively large space allotment.

The noise, fumes, and dust produced during the fabrication of models will necessitate a separate room for this function. The room needs ample working surface, sinks, exhaust hood, numerous electric outlets, air and gas supply, and various power tools. Minimum production requires 80 to 120 square feet. Large production involving more of the many techniques and materials available today could justify the need for several times that amount of space.

Black and White Copy Photography – Artists often need a high contrast photographic print or film positive as an intermediate step in the completion of a project. This type of photography may be required in almost any type of production, but demand is greatest in publication and exhibit work. In most departments, the photographic unit supplies this need. However, it may be more efficient to provide the art unit with the means of performing this work, thus avoiding disruption of the photographers' production schedule and eliminating hitherto unavoidable delays for the artists. This capability combined with a transparent color acetate "proofing" system can add possibilities for creative effects in many types of visuals and provide for previewing publication art in its final color before it is printed.

Self-contained equipment is available to produce photographic paper prints or film positives in a fully lighted room within a short time. Approximately 50 square feet of space should be allowed in the common work area for this type of equipment. Other approaches may necessitate a darkroom with "wet" functions and a minimum of 80 square feet.

Animation – Motion picture art and animation can be produced in the space provided for individual artists. An art unit which produces a light volume of this type of work usually contracts to have the finished art filmed commercially. A heavy volume of animation may justify the acquisition of an animation stand on the basis of economy, quality control, and efficiency. Maximum benefits of an in-house animation stand can be realized only if the stand is adjacent to the art unit in order to facilitate work-flow and communication between artist and cameraman.

A separate dustproof room, absolutely free of distractions, is a necessity for the animation cameraman and his equipment. *(see Figure 13)* Adequate space is required for the stand, lights, and materials storage. A desk is needed for plotting camera action, and inspecting and organizing the animation art before shooting. A minimum of 250 to 300 square feet is required.

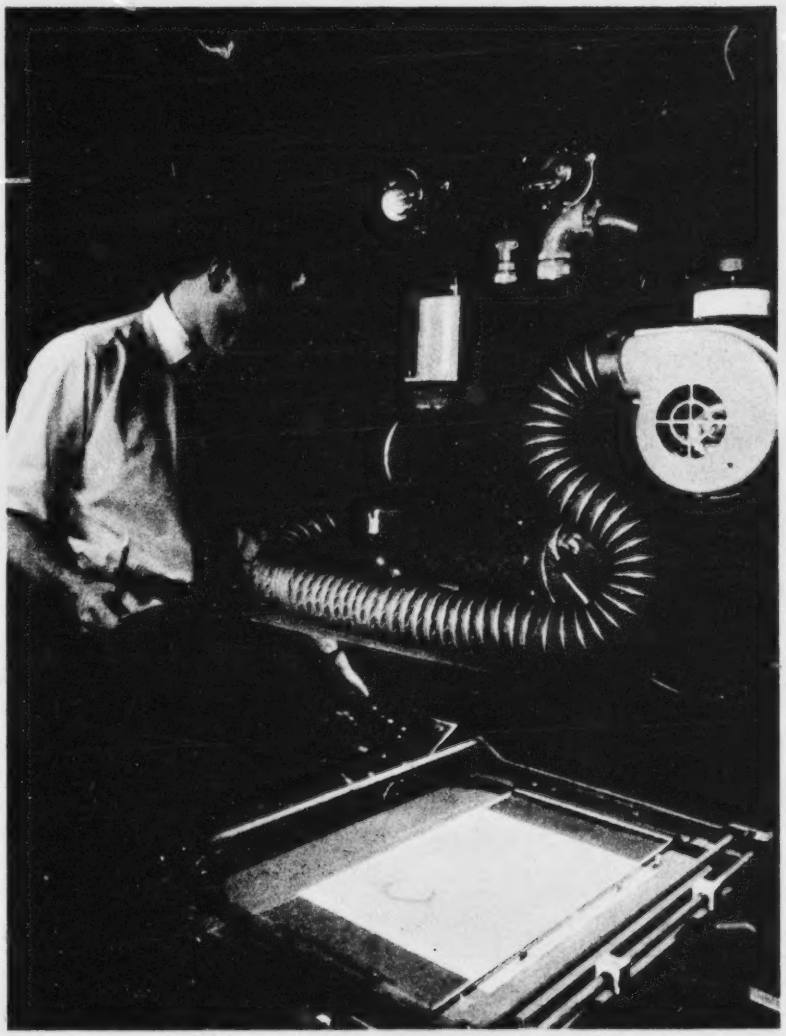


Figure *13. Animation stand used in filming art for motion pictures*

Television Set Production – If television production sets are designed by the art unit, facilities are needed for construction and storage. In most instances, however, the institution's carpenter shop can provide construction. If the communications department has its own shop for exhibit production, construction of sets also could be accomplished. Storage of props generally becomes the responsibility of the television unit and may require a separate room.

EQUIPMENT REQUIREMENTS

Equipment needs for an art unit are dictated by the range of services, the volume of work, and individual preferences. Specific types of equipment needed for efficient production vary widely in design, function, quality, and cost. In most instances, the additional expense for top quality items is returned many times over in greater efficiency and durability of the equipment.

The following should be considered as a checklist of possible major equipment and furniture. Specific brands and models are not recommended since new developments can make any advice obsolete overnight. More importantly, equipment should be chosen by the persons that will be using it, on the basis of their experience and preferences.

Equipment for Individual Artists

A drawing table is needed for each member of the unit. The size depends on the types of work to be performed. In some instances, special modifications may be required, such as providing a lightbox and animation disc for animators. One table can serve mutiple functions by designing interchangeable working surfaces for it. Professional drawing tables range from $60 to $200 depending on size and quality of construction. Larger, more versatile tables with built-in storage drawers can cost up to $500.

A **desk** is needed in addition to a drawing table by medical illustrators and some other members of the unit. Combination desk-drawing tables are available for approximately $450 to $600.

A **T-square** is needed for each artist. Design varies greatly from the classic "T" costing only a few dollars, to elaborate systems which are mounted permanently on the drawing table and cost up to $250.

Chairs must be provided for each artist and his clients. One chair in addition to the artist's will generally suffice if extra ones are near so that they can be used when needed.

A **taboret** is required for each artist to store supplies and provide for convenient placement of drawing instruments near at hand. Cost ranges from approximately $50 to $150.

A **desk lamp** is needed for each member of the unit. Lamps with combined fluorescent and incandescent bulbs most closely approach the color balance of daylight. Cost of lamps ranges from approximately $30 to $60, with the combination units costing about $40.

A **telephone** for each illustrator is important for communication with clients with a minimum of disruption to the work at hand. Often the subject of a phone conversation will be artwork taped to the artist's drawing table, making it very inconvenient to use a centrally located phone.

An **x-ray viewer** should be available for each medical illustrator to review roentgenograms with clients. Single units cost from $40 up.

A **pencil sharpener** should be provided for each artist. Consideration should be given to electric models which combine speed with a better point. Manual sharpeners range from $5 to $10; electric models, $20 to $40.

An **electric eraser** should be supplied for each artist. This instrument is not a luxury and provides for correction of some types of artwork that cannot be accomplished any other way. Cost ranges from approximately $16 to $30.

Book shelves for individual artists are needed for reference material, file jackets, and supplies for work in progress.

Lettering instruments are required for each chartist and for some other members of the unit. Selection should be based on individual preference and experience. Cost for complete sets can range from approximately $50 to over $125, depending on the number of drawing points and templates.

An **artist airbrush** is used extensively by some illustrators and only occasionally by others. One instrument may be shared by a number of illustrators for occasional use, and can be selected from models ranging from $40 to $100.

If compressed air is not available from a central source, portable tanks are preferable to a noisy compressor unit. Refillable tanks with regulator and gauge cost around $85. Compressors cost between $50 and $200.

Electric typewriters with oversize type costing approximately $600 can be used by the chartists to produce charts, graphs, and tables for slides quickly and effectively.

An **instrument tray or stand** for small instruments and supplies should be furnished for each artist. Rotating models costing around $7 combine ready access with good organization.

A **drawing set** including compasses, ruling pens, and dividers is needed by each member of the unit. Complete sets may be purchased for $30 to $100, or individual instruments may be acquired separately. Economizing through the purchase of lower quality is a serious mistake when buying these instruments.

Individual illustrators will need certain equipment and instruments in addition to that listed here including drawing pens and pencils, scissors, brushes, mat knives, frisket knives, burnishers, a slide viewer, and a myriad of other very necessary items which are determined by individual needs.

Equipment for a Common Work Area

A work table for laying out large projects is needed in the common work area. Large art units will require more working surface, especially for certain types of work such as exhibits and publications. One table with a wood top should be reserved for a cutting surface.

A **tracing table** will be required for occasional work by every member of the unit. A large art unit may require several tracing tables which can range in cost from $200 to $400.

Bookshelves and storage cabinets are required for reference materials and supplies such as press-on letters, acetate sheets, and so forth. Large flat files should be provided for storing drawing paper and other large materials. Often the top surface of these files can serve as additional working surface.

A **sink** for mixing paint and cleaning brushes and drawing instruments should be located in the common work area.

A **paper cutter** is needed for any size unit. Sometimes two will be most practical: a large one for heavier cardboards and a smaller one for lighter materials. High quality and large size are a good investment. Prices range from $75 to $550.

A **dry mounting press** is needed for mounting finished drawings and photographs. A relatively large press is more efficient. Prices range from $100 to $500 depending on size. A small accessory tacking iron costs approximately $20.

A **wax adhesive applicator** is a necessity in publication layout and is convenient in other types of work. Small hand models cost about $20 but are limited in usefulness. Table top models cost from $200 to $400.

A **commercial art projector** which projects enlarged or reduced images for tracing purposes is a valuable timesaver for all members of the unit. Models range in price from approximately $200 to over $600. A Polaroid camera is very useful in conjunction with this device.

A **black and white copy camera** can be a timesaver in the larger units. The function of this equipment is discussed on page 25. A self-contained unit which can produce prints or film positives in a lighted room costs around $4,000.

Exhibit Production

Regardless of the techniques used for exhibit production, large tables are a necessity. A small workbench equipped with basic hand tools is needed for mounting transparencies, assembling exhibits, and other activities. The tools should include hammers, screwdrivers, pliers, wrenches, and an electric drill. Most other equipment needed for exhibit production is involved with the silkscreen process.

An **exposure light and vacuum frame** is needed to expose the photosensitive silkscreen film. *(see Figure 14)* Various types of lights may be used for making exposures, but an arc lamp is the most effective. Models which combine the arc lamp and vacuum frame into a single unit are the most efficient to use. Cost can range from $400 to several thousand dollars, depending on size and convenience of use.

A **large sink and developing tray** is necessary to develop and wash out the screens. The same sink can be used for removing emulsions from used screens.

A **screen washer** which recirculates the ink removing solvent is a valuable timesaver when used in conjunction with a washing stand. Prices for a washer and stand range from approximately $200 to $400. An exhaust vent should be provided.

An **emulsion remover** provides a high pressure spray of hot water to efficiently remove emulsion from the silk after use. Cost ranges from $300 to $400.

An **electric heatgun** costing around $50 is a valuable timesaver which provides a means to quickly dry silkscreen ink between screenings.

Typesetting – In-house production of cold-type generally requires two units: a phototypesetter for large copy, and a composing system for body copy. Phototype equipment which combines these two functions generally is too expensive to be cost-effective for the production volume of institutional departments, and larger sizes needed for exhibit work might have to be enlarged photographically.

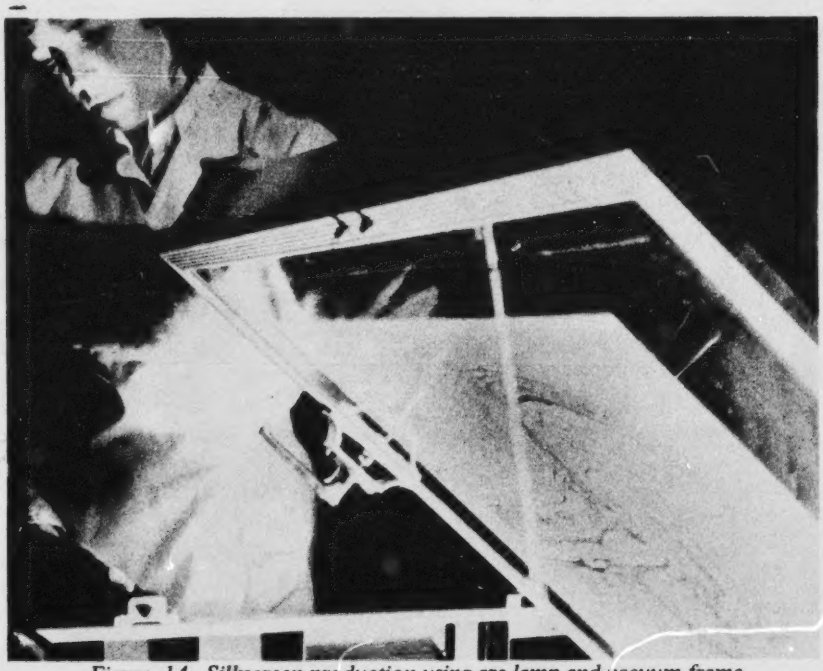


Figure *14. Silkscreen production using arc lamp and vacuum frame*

The **phototypesetter** produces reproduction quality type on paper or film for exhibit copy, brochure headlines, posters, movie titles, and other applications where larger character sizes are required. Phototype also may be used for labeling charts, graphs, and drawings. Some phototypesetting units require a separate font for each size and are limited to the maximum size of type which they produce. Others provide a full range of type size and expand, condense, or slant characters from a single font. The less expensive models require more fonts to provide a full range of styles and sizes, are less efficient to use, and require expensive intermediate photographic enlargement to produce large sizes.

The **composer** produces the small type sizes used for text in brochures and other publications. *(see Figure 15)* These systems range from typewriter size stand-alone models to large systems utilizing two or more units about the size of a desk. Copy is recorded onto magnetic or paper punch tape with an input unit. Column width, headings, and other variables are programmed into an output unit, and the tape is played back to produce finished cold-type at high speed. Separate fonts are required for each type style and size.

Three-Dimensional Models

The equipment required for production of three-dimensional models, plastic embedding, and fabrication of prostheses depends on the type of work produced and the materials employed. Adequate working surface is essential. The final equipment list must be compiled by the model-maker who will use the facility.

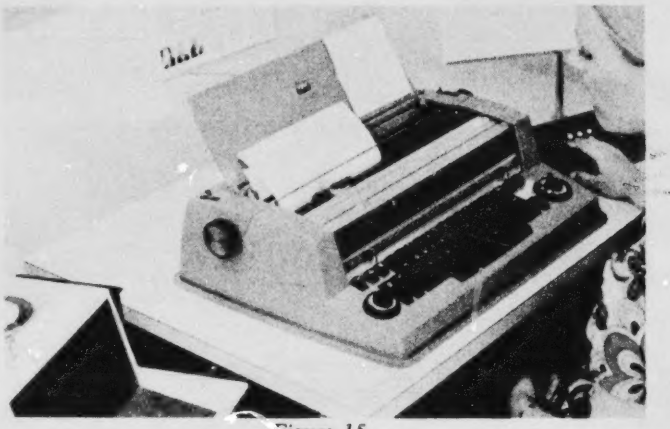


Figure 15.
Composer system for producing typography used in publications

Generally, hot plates and bunsen burners with adequate exhaust hoods are needed. A large deep sink should be equipped with a special trap arrangement to prevent stoppage of drains with plaster of paris. Accurate scales, a heavy-duty electric mixer, and power hand tools, including a grinder, disc sander, and drill, are used in many types of work.

A vacuum chamber will be needed to remove bubbles from some materials in their liquid state before they are cast into a mold. A vacuum former may be useful for some types of model making.

Animation

A peg bar to accurately register the punched acetate cels used in animation is all that is needed for an artist to produce motion picture art on a small scale. Cost is approximately $10.

An **animation disc** which incorporates one or two sliding peg bars provides more convenience for producing a larger volume of animation cels. (see Figure 16) It is placed in a circular transilluminated cut-out in a work surface. This device is very useful for producing slide and filmstrip graphics employing the same acetate cell techniques used in animation. Cost of an animation disc runs slightly over $100.

Cel racks constructed on wheels prove very convenient for the animator. Cels may be safely stacked in the racks while the ink or paint is still wet. Art is kept well-organized during production and then rolled into the animation camera room where the cels are removed directly from the rack for filming. After the film footage is screened for acceptability, the cels are removed from the racks and safely filed.

A **cel punch** costing around $400 is used to punch tracing paper and acetate cels for the peg system used on the animation camera. Prepunched paper and cels may be purchased at a slight additional cost if volume of animation work does not justify purchase of a cel punch.

An **animation stand** requires a major expenditure and should be considered only by facilities having a large volume of animation work. Some types of simple animation can be produced on a copy stand by an ordinary motion picture camera with a single frame motor. Relatively unsophisticated animation stands are available for around $5,000, and larger more versatile models can cost in excess of $50,000.

Figure *16.*
Animation disc and cel racks used in the production of art for film graphics

A **hotpress** costing $500 to $1,000 may be used for production of movie titles. However, other techniques are available which produce quality titles without such a large expenditure for equipment.

OPERATIONAL PROCEDURES

Departmental operational procedures vary according to the method of financing and other institution policies which effect the communications department. This chapter will describe the procedures employed in the author's department. Some of the steps could be eliminated under certain circumstances. Others could be modified to fit specific requirements, and, in some cases, certain functions could be accomplished by a computer.

RECEIPT OF JOB

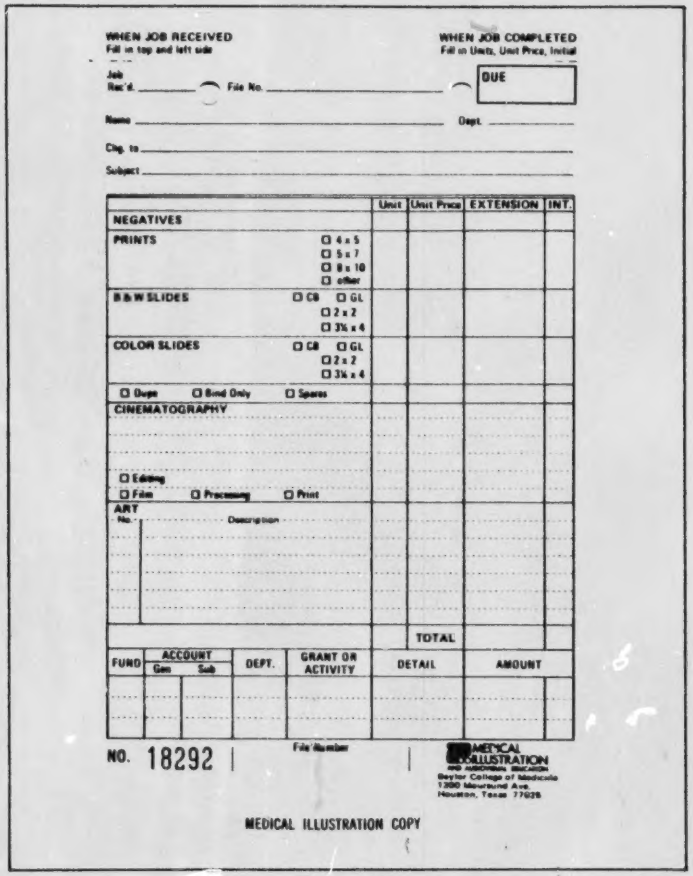
Incoming work is received by a receptionist who enters it in a log book and assigns it a permanent file number. A file jacket is prepared containing the file number, title of the job, the client's name, and department. If the work is a continuation of an existing job, the jacket is pulled and a job ticket prepared. Control data such as job title, client's name and department, payment source and delivery date are entered on the top of the ticket with a description of the work required (number of slides, prints, etc.) recorded on the lower half of the ticket. (see Figure 17 Should the client bypass the receptionist and proceed directly to an artist he has worked with before, the artist reviews the job with him and then directs the client to the receptionist for logging the job and obtaining the required data.

The control data and master index classification is recorded on a 3 x 5 file card and filed in a cross-index file along with separate cards for each cross-index classification selected.

Some academic departments use a requisition form requiring approval by the departmental chairman. (see Figure 18) The form shown provides a copy for the communications department file jacket and another copy for the client's departmental files. Institutions which provide total or substantial subsidy for the work of the communications department generally require such a requisition for each job. A single form can function as both requisition and job ticket.

JOB IN PROGRESS

After the job is logged in, the client is directed to the appropriate member of the department. Should the client request a certain artist, or if the nature of the work obviously requires the abilities of a specific member of the art unit, the client is sent directly to that artist. When work may be accomplished by any of a number of members



WHEN JOB RECEIVED
Fill in top and left side

WHEN JOB COMPLETED
Fill in Units, Unit Price, Initial

Job Rec'd. _____ File No. _____ DUE

Name _____ Dept. _____

Chg. to _____

Subject _____

		Unit	Unit Price	EXTENSION	INT.
NEGATIVES					
PRINTS	☐ 4 x 5 ☐ 5 x 7 ☐ 8 x 10 ☐ other				
B & W SLIDES	☐ CB ☐ GL ☐ 2 x 2 ☐ 3¼ x 4				
COLOR SLIDES	☐ CB ☐ GL ☐ 2 x 2 ☐ 3¼ x 4				
☐ Dupe ☐ Bind Only ☐ Spares					
CINEMATOGRAPHY					
☐ Editing ☐ Film ☐ Processing ☐ Print					
ART					
No.	Description				
			TOTAL		

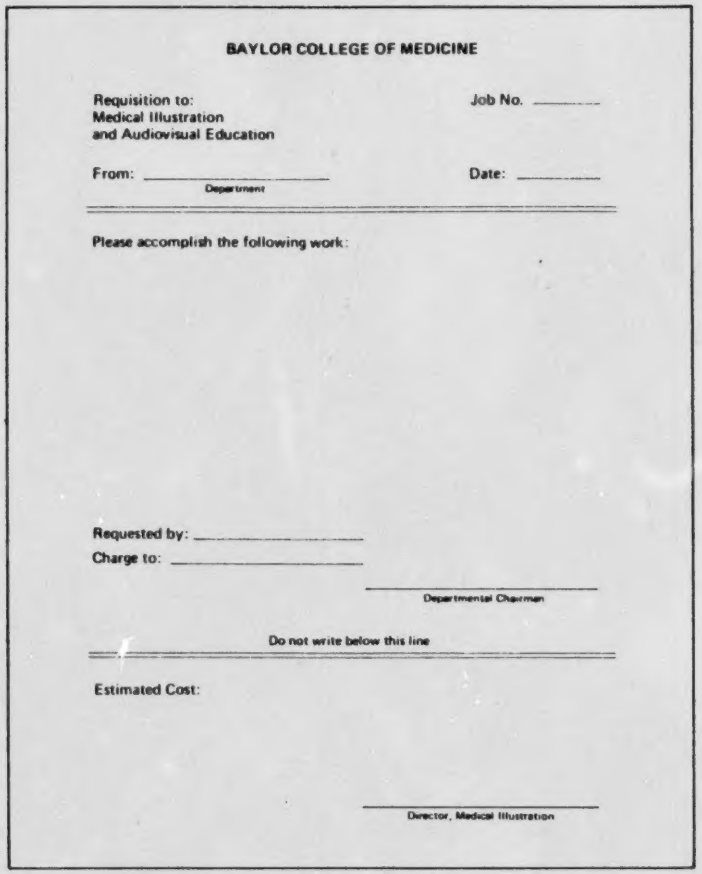
FUND	ACCOUNT Gen	ACCOUNT Sub	DEPT.	GRANT OR ACTIVITY	DETAIL	AMOUNT

NO. 18292 | File Number |

MEDICAL ILLUSTRATION
Baylor College of Medicine
1200 Moursund Ave.
Houston, Texas 77025

MEDICAL ILLUSTRATION COPY

Figure *17.*
Job ticket which provides for recording of pertinent information when assignment is received. Multiple copies are provided for billing and files.



BAYLOR COLLEGE OF MEDICINE

Requisition to:
Medical Illustration
and Audiovisual Education

Job No. _____

From: _____ Date: _____
Department

Please accomplish the following work:

Requested by: _____

Charge to: _____

_____
Departmental Chairman

Do not write below this line

Estimated Cost:

_____
Director, Medical Illustration

Figure *18.*
Requisition form for assignments requiring departmental authorization

of the unit or requires the coordinated efforts of several artists, the client is directed to the unit supervisor. If the request is a large project that requires work with other units within the department, the client is referred to the departmental director for planning and coordination.

If at all possible, the client goes over the work with the artist who will do the actual work. In the unusual event that the unit supervisor must wait for completion of current assignments before he can determine who will do the work, he may discuss the job with the client and then instruct the appropriate artist later. If the assignment requires personal discussion with the artist performing the job, the client will be called for consultation before work is started. In most cases, the artist obtains the client's approval of preliminary sketches or layouts before beginning final renderings. Finished drawings also receive client approval before being sent to photography, printing, or other final steps of production.

When an illustrator finishes his part of a project, he records his time on the job ticket, initials it, places it in the file jacket with the job, and passes it on to the next step in production. In most cases the finished photography is checked by the illustrator before delivery to the client. If a project extends over several days, the illustrator records his hours on a time sheet.

The following two considerations in handling a job are more a matter of philosophy than strict adherence to efficient operational procedures, and warrant further discussion.

The **client-artist relationship** is important and the client should communicate directly with the working artist whenever possible. This is not a problem in small art units, but artists in large operations must guard against a production-line approach to their work. Artists should establish a rapport with regular clients, even to the extent of developing background knowledge of the client's subject matter and personal preferences.

The knowledgeable artist can make an important contribution to the conceptualization of effective visuals. He should not treat the client's preconceived notion of the final product as sacred but should suggest modifications and improvements to him. The concept of the client and artist as equal members of a team will provide the most effective final product.

Deadlines can be a problem and any medical and graphic arts unit that does not provide top quality illustrations at the time they are needed is not serving the needs of the institution. (see Figure 19) A cooperative effort by the institution's administration, faculty and members of the medical and graphic arts unit will assure production of quality artwork when it is needed. The administration should support the unit by providing funds for adequate salary levels for a sufficient number of well-qualified artists and for good equipment and physical facilities. The faculty clientel can appreciate the time required to produce quality art and not request avoidable tight deadlines on a routine basis. Members of the art unit should recognize a professional obligation to meet legitimate deadlines and devote the extra effort required to do so when necessary. The unit supervisor can help to meet deadlines by efficient scheduling of workloads and establishing priorities which do not interfere with other obligations. It is important to establish a mechanism by which only the unit supervisor, or perhaps even the departmental director, can refuse an unreasonable deadline.

Figure 19. *"If I wanted it tomorrow, I would have brought it in tomorrow."*

DELIVERY AND BILLING

Upon completion of a job, the file jacket, job ticket, original art, negatives, and other file materials are placed in the billing file. The secretary responsible for billing calculates charges for the work and enters the costs on the job ticket. The top copy of the four-part snapout job ticket is retained in the job's file jacket. Two copies are sent to the school's business office which retains one copy of the job ticket and forwards the other copy to the client or his department with a monthly computerized financial statement. The fourth copy is kept by the communications department for reference in preparing monthly and annual reports. These reports detail production information according to number of units produced and individual academic department usage of the services. This information is important for tabulation and analysis of activity pertaining to charge rates, justification for additions in personnel and equipment, and other evaluation of work trends.

CATALOGING AND STORING ORIGINAL ART

After billing is completed, the file jacket with a copy of the job ticket, negatives, and other materials is filed for possible future use. Original artwork too large for the file jacket is placed in an envelope identified by the file number, title, and client. These envelopes are color coded according to a number of useful designations and filed in numerical order. Storage within the central communications department is preferable to storage in the client's home department where materials are more easily lost or damaged.

SUPPLY INVENTORY

A supply inventory is taken monthly and needed supplies ordered. Generally, a minimum of a two-month supply of each item is kept in stock and the level increased when the quantity drops below a one-month supply. A limited number of items that are difficult to obtain or subject to sporadic heavy use are maintained at a higher level. The artists are queried about unusually heavy needs that may be anticipated for specific items. Needs for new or replacement equipment and instruments are entered in a central book. Monthly orders of supplies are approved by the communication department's director. All large expenditures must be justified and approved in advance.

Ordering on an irregular "when needed" schedule or maintaining an inadequate inventory will result in waiting for supplies to come in and the added administrative cost of many small rush orders.

A system similar to the one described will save a great deal of time and paper work for an art unit of any size.

APPENDIX I

SOURCES OF MEDICAL ILLUSTRATORS

As the demand for qualified medical illustrators increases, securing highly skilled personnel may prove difficult at times. Thus it may benefit health sciences institutions to be aware of the sources of trained medical illustrators:

The Department of Art as Applied to Medicine
Ranice W. Crosby, Associate Professor and Director
The Johns Hopkins University School of Medicine
725 N. Wolfe St., Baltimore, Maryland 21205
M.A. Degree, 2 year program

The Department of Medical and Dental Illustration
A. Hooker Goodwin, Professor and Director
University of Illinois – Medical Center
833 South Wood St., Chicago, Illinois 60612
B.S. Degree (5 year curriculum, including
2 years in medical art specialty area)

The School of Medical and Biological Illustration
Gerald P. Hodge, Associate Professor and Director
University Hospital, N.O.B.
The University of Michigan Medical Center
Ann Arbor, Michigan 48104
M.S. Degree, 2-1/2 year program

The Department of Medical Illustration
Orville A. Parkes, Professor and Director
The Medical College of Georgia
Augusta, Georgia 30902
B.S. Degree (4 year curriculum, including 2 years
in medical art specialty area)
M.S. Degree (1 year program)

Art as Applied to Medicine Department
Nancy G. Joy
Associate Professor and Director
University of Toronto
256 McCaul St., Rm. 304, Toronto 2b, Ontario, Canada

Department of Medical Art and Visual Education
William A. Osburn
Associate Professor and Chairman
University of Texas Southwestern Medical School
5323 Harry Hines Blvd., Dallas, Texas 75235

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Unfortunately, not all medical illustration training programs are of uniform quality. One index of the quality of medical illustration programs is the set of standards developed by the Association of Medical Illustrators. These AMI standards set strict criteria for training programs and schools which meet them can generally be relied upon to produce quality graduates. Additional information on educational programs for medical illustrators may be obtained from the chairman of the AMI Accreditation Committee:

Bill J. Briggs
Director, Section of Medical Illustration and
Assistant Professor of Anatomy
St. Louis University School of Medicine
1402 South Grand Blvd., St. Louis, Mo. 63104

The Association of Medical Illustrators will aid institutions looking for a qualified medical illustrator by circulating a notice throughout its membership. A directory of the AMI membership is available at cost and this provides a listing of practicing illustrators. These services are available from the corresponding secretary of the AMI:

Octavia Garlington
Medical Art Services
Medical College of Georgia
Augusta, Georgia 30904

APPENDIX II.

BIBLIOGRAPHY

The following references apply specifically to the functions of the medical and graphic arts unit. In addition to the listings here, the art unit needs references for anatomy and other scientific disciplines in which they are involved. Other publications should be collected to provide access to outstanding illustrations, and a morgue of effective visual materials should be compiled. Books pertaining to the broader fields of communications and instructional technology should be available in the departmental reference library.

BOOKS

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Wittich, W. A. and Charles F. Schuller: *Audio-Visual Materials: Their Nature and Use.* New York: Harper and Row, 1967.

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PERIODICALS

Annual of Advertising, Editorial and Television Art and Design
Watson-Guptill Publications
165 West 46 Street
New York, New York 10036

Communication Arts
Coyne and Blanchard, Inc.
P.O. Box 10300
200 California Ave.
Palo Alto, California 94303

Graphis
Graphis Annual
Illustrators: Annual of American Illustration
The Penrose Annual
Visual Communication Books
Hastings House Publishers
10 East 49th Street
New York, New York 10016

Industrial Arts Methods
Syndicate Magazines, Inc.
25 West 45th St.
New York, New York 10036

Medical Art
The Journal of the Association of Medical Illustrators
Mr. James Burch
Ames Road R.F.D. #4
Mahopac, New York 10541

Print
6400 Goldsboro Road N.W.
Washington, D.C. 20034

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ILLUSTRATION CREDITS

Figures 1, 2, 10, 11, and 19 – Art Barry Baker

Figures 3 and 4 – Art, Bill Stanger

Figure 5 – Art, Herb Smith

Figure 6 – Exhibit design, Herb Smith; Photography, Robert Beaubien

Figure 7 – Photography, Herb Smith

Figures 8, 12, 13, 14, and 15 – Photography, Robert Beaubien

Figure 9 – Photography, Lindsey Lampp

Figure 19 – Photography, Robert Simmons

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